SYSTEM TO ASSESS ACTIVITY LEVEL OF A USER

CROSS-REFERENCE TO RELATED APPLICATION

This application is a Continuation Application which claims the benefit of pending U.S. patent application Ser. No. 12/886,374 filed Sep. 20, 2010, which claims the benefit of U.S. Provisional Application No. 61/243,839, filed Sep. 18, 2009. The disclosures of each of these applications are incorporated herein by reference in their entirety.

BACKGROUND

Advancements in materials have led to a variety of improvements in prostheses, including the use of low weight, high strength materials and energy storage and release components. The variety of choices in prosthesis components is meant to fit with the variety of lifestyles led by lower limb amputees. For example, an elderly person that has a low activity level may not require the most advanced materials. On the other hand, a strong and physically active person may desire a prosthesis that will withstand a more rigorous lifestyle. Both high and low activity prosthesis wearers require that the prosthesis be matched with their lifestyle to ensure that the prosthesis improves their quality of life.

In order to properly assess the activity levels of lower limb amputees, the Medicare program administered by the United States Government has developed an index for assessing an amputee's functional level. The Medicare system of "K" codes provides a set of categories used to distinguish between activity levels of amputees. In the lowest level, K0, the patient does not have the ability or potential to ambulate or transfer safely with or without assistance, and a prosthesis does not enhance their quality of life or mobility. In the next lowest level, K1, the patient has the ability or potential to use a prosthesis for transfers or ambulation on level surfaces at fixed cadence. At the next level, K2, the patient has the ability to traverse low-level environmental barriers such as curbs, stairs, or uneven surfaces. At level K3, the patient has the ability or potential to traverse most environmental barriers and may have vocational, therapeutic, or exercise activity beyond basic ambulation. At the highest level, K4, the patient has the ability or potential for prosthetic ambulation that exceeds basic ambulation skills, exhibiting high impact, stress, or energy levels.

The clinician treating the amputee patient prescribes a prosthesis by assigning the patient to one of the K codes defining the activity level. A problem arises in that there is no objective way to measure activity level. A problem also arises because an overdesigned prosthesis may result in imbalance or instability issues for the wearer too weak to properly control the prosthesis. An underdesigned prosthesis will curtail the lifestyle of an active wearer due to having to compensate for a deficient prosthesis. Both situations usually lead to a reduction in the quality of life and rehabilitation of the patient.

Up until the present time, assessing the functionality of an amputee patient is mostly a subjective evaluation. Based on clinical experience and without any objective tool, some clinicians may decide to underprescribe a prosthesis in order to save on costs or because the clinician does not believe that the patient will be fully rehabilitated to a high functional level. On the other hand, if the clinician overprescribes a prosthesis, the prosthesis is overdesigned and underutilized, thus wasting resources that may be put to better use. In either case, over-

prescription or underprescription of a prosthesis may diminish the quality of life for the patient, or hamper their rehabilitation because the prosthesis is not correctly fitted.

Accordingly, a tool is necessary to properly assess the functional level of activity of a lower limb amputee.

SUMMARY

This summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This summary is not intended to identify key features of the claimed subject matter, nor is it intended to be used as an aid in determining the scope of the claimed subject matter.

A first embodiment is related to a system for assessing the activity level of a lower limb amputee. The system includes a pedometer comprising a sensor to determine a step, a clock to keep track of the time period that the pedometer is recording steps and a memory to record the steps and time, a user computer connected to a network in communication with a server computer, wherein the user computer comprises a local functional assessment tool that configures the pedometer to record step data and receives recorded step data from the pedometer; and a server computer in communication with the user computer through a communication network, wherein the server computer comprises a remote functional assessment tool that receives the step data from the user computer and processes the data to provide an activity level of the amputee.

In the first embodiment, the server computer may host a Web site that provides a service for assessing the functional activity level of a lower limb amputee, a client manager tool, and an online database.

In the first embodiment, the remote functional assessment tool may receive inputs of a cadence variability, a potential to ambulate, an ambulation requirement, and a clinical observation to provide the activity level of the amputee.

In the first embodiment, the remote functional assessment tool may provide a value describing a cadence variability as a variance in the amount of time that the amputee spends at a plurality of levels of step rate in a defined period of time.

In the first embodiment, the remote functional assessment tool may provide a value describing a potential to ambulate as a number of steps taken by the amputee in a defined period of time.

In the first embodiment, the remote functional assessment tool may provide a value describing the ambulation requirement as a maximum number of steps taken by the amputee in a defined period of time.

In the first embodiment, the system may further include a docking station connected to the user computer, wherein the docking station communicates with the pedometer.

A second embodiment is related to a method for assessing the activity level of a lower limb amputee executed using one or more computers. The method includes recording the number steps taken by a lower limb amputee over a defined period of time, calculating a first value describing a cadence variability from the recorded steps, calculating a second value describing a potential to ambulate from the recorded steps, calculating a third value describing an ambulation requirement from the recorded steps; and calculating an activity level based on at least, the first, second and third values.

In the second embodiment, the cadence variability is described as a variance in the amount of time that the amputee spends at a plurality of levels of step rate in a defined period of time.